Space Weather Forecast

Issued on Sunday, 04 September 2022 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of R1/R2 Radio Blackouts. G1/G2 Minor/Moderate Geomagnetic Storm expected day 1 and day 2 (4th & 5th).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low, with periods of common class flares throughout. Of the four active regions on the visible disc, AR3089 remains the largest and most complex region. This region continues to grow in areal extent and remains a delta magnetic configuration. The other 3 sunspots in the east remain relatively small and simple, largely inactive with no or limited growth. No Earth-directed CMEs (Coronal Mass Ejections) were observed.

Solar Wind / Geomagnetic Activity: The solar wind was indicative of a transition from one high speed stream into another stronger high speed stream. The solar wind speed fell from elevated to slightly elevated before then increasing to strong during the 4th. Total interplanetary magnetic field strength was initially weak but became moderate from 03/2345 UTC. The north-south component was mostly negative, with sustained periods of moderate to weak negative Bz during the 4th. Geomagnetic activity was Unsettled (Kp3) initially, before intervals of successive G1/Minor, G2/Moderate and G3/Strong storms (Kp5, 6 and 7 respectively) were observed using BGS data during 4th September.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is at background levels, with no solar radiation storms occurring

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to remain largely Low, with an ongoing chance of Moderate flares, mostly from AR3089. This spot will likely exert influence on the flare risk due to it's location until the end of day 4 (7th). A new region may rotate onto the northeast limb on day 2 (5th), potentially increasing the probabilities of significant flares.

Solar Wind / Geomagnetic Activity: The coronal mass ejection that left the sun on 2nd Sept may give Earth a glance on day 2 (5th). No other Earth-directed coronal mass ejections expected. Solar winds are initially expected to be strong on day 1 (4th) due to the high speed stream from coronal hole 20. Solar wind speeds will gradually ease to elevated by day 2 (5th) before a brief rejuvenation due to the coronal mass ejection form the 2nd. Solar winds should then fall back to slightly elevated by day 3 (6th) or day 4 (7th). Further periods of G1/Minor to G2/Moderate Geomagnetic Storms are expected on day 1 (4th) and perhaps into day 2 (5th), with a slight chance of further G3/Strong (Kp7) Storms. The baseline Geomagnetic activity should begin to reduce to Quiet to Unsettled into day 3 (6th), or perhaps day 4 (7th).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to remain below the Minor Radiation Storm level (S1). There remains a slight chance of further increases to or above the S1 level, should any significant flares occur from the large region on the visible disc.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	90	70	20	10
Strong	G3	No	15	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	45	45	45
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	3	3	3	3
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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